

Hide and Seek Sandstone

Geology by Satellite

eo
Kids
earth observatory for kids



Finding Faults

Different types of sandstone and limestone were deposited in layers and folded to make the Tien Shan Mountains in China. By comparing small differences in infrared light reflected by the surfaces, the different rock layers become easy to spot. From a satellite's view, they look like stripes. The gold and dark gray layers are sandstone, and the light brown layers are limestone. Sometimes layers of rock move quickly (usually during earthquakes) and can cause large portions of the land to break and move, creating a fault.

Geologists don't always have to go digging to see the different types of rocks and minerals in a landscape. When they want to map the types of rock across large areas, they can use satellites. Small differences in the way rocks reflect sunlight make it possible to identify the different types of rock from space. The different layers of rock can tell a story about the history of the land.

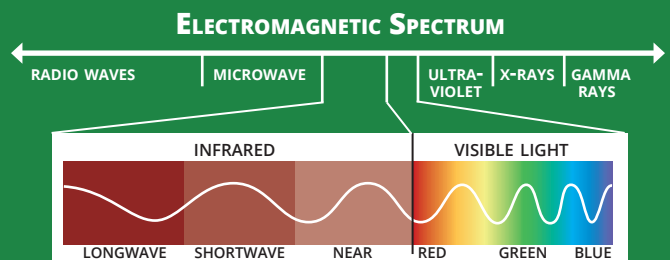
Vocabulary:

geologist – A scientist who studies rocks and minerals.



Mapping Mineralogy with Light

Many NASA satellites can see features that our eyes and brains cannot. By measuring wavelengths of light in the infrared part of the spectrum, for instance, geologists can tell the difference between limestone and sandstone from space.



Layers Tell a Story

Rocks are laid down on the Earth in layers, like blocks stacked in a tower. Older rocks were deposited first and are usually at the bottom. The rocks closer to the top (surface) were deposited later and are younger.

When winds blow or water flows over the ground, the younger rocks on top crumble and wash away. This process is called **erosion**. As the younger rocks are chipped away from the surface, older rocks become visible.

1. Rocks are deposited in layers. Youngest rock on the top.



2. Layers bend as Earth's plates move.



3. Erosion exposes the older layers of rock.



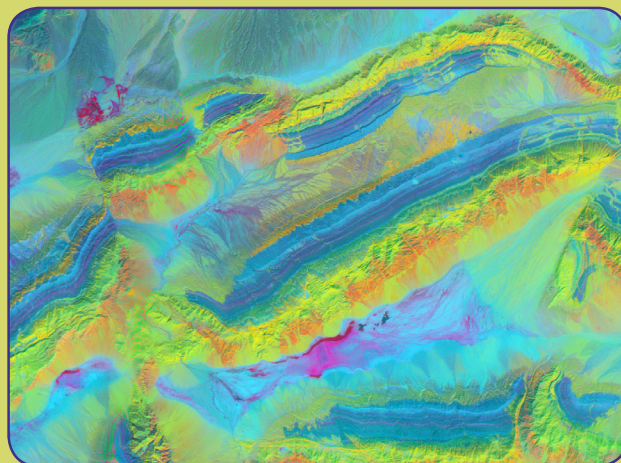
Sometimes wind and water will erode enough rock to reveal patterns in the layers of the landscape. These patterns are visible from space and can tell geologists not only about the types of rock layers in an area, but also how these layers moved.

Super Satellite Vision

Satellite instruments collect information about the different types of light that rocks absorb and reflect. Scientists can use that information to identify different types of rock.

The differences may not be visible in a near-infrared image (like the image on page 1) or in a natural-color image, like a photograph.

This image shows the same scene from page 1, but in shortwave infrared light. Different wavelengths of light were assigned colors that we can see. This makes it easier to spot the different rock layers, even if the differences are really small.



All of the layers are **sedimentary rock**, like sandstone and limestone. In this image sandstone is purple and blue. Limestone is yellow and orange. Soils and rocks that looked tan on page 1 show up in many different colors here. These colors tell scientists about the geologic history of this area

Vocabulary:



sedimentary rock – A type of rock formed when sand, pebbles, mud, or the remains of plants and animals settle in layers and are squished into solid rock by the pressure of the layers above.

erosion – The act of breaking down and moving parts of rocks or soil by wind, water, or gravity.

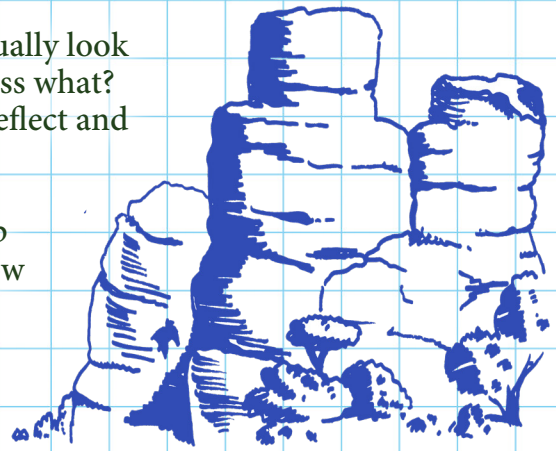
Maker Corner

Cutting into the Past

If you are standing on a pile of rocks, chances are they usually look pretty similar – varying shades of brown or gray. But guess what? These rocks may be very different, both in the light they reflect and in their hardness.

The different types of light that satellites measure can help scientists look for different layers of rocks and identify how they have moved over time. Geologic forces, like **folding** or **faulting**, change how layers of rock are situated on Earth's surface. Erosion can reveal these layers.

Create your own layered landscape using two different colors of modeling clay to represent sandstone and limestone. Create your own fold, and then erode it away.



Vocabulary:

fold – Layers of bent rock.

fault – Layers of rock that have moved quickly and broken.



Try It!

You will need:

- Modeling clay
- Rolling pin or large marker
- Butter knife

1

Choose two different colors of modeling clay.



2

Roll each color of clay into a flat surface.



3

Stack the colors of clay on top of each other.



4

Fold the stacked modeling clay into a "W" shape.



5

Turn the folded structure on its side and slice in half.



6

Turn the structure upright to see the exposed layers of clay.

Questions:

Imagine that the structure is miles or kilometers across and answer the following questions:

1. If you were looking down from space, what patterns would you see?
2. Where is the oldest rock layer located?
3. Where is the younger rock layer located?
4. What do you think your clay landscape would look like from space and where might you find it?



This photo from the island of Crete in Greece shows an example of folded limestone layers.

What is Happening?

By laying the two colors of modeling clay on top of each other, you created a model of sedimentary rock deposited in layers. The bottom layer was deposited before the top layer, which means that the bottom layer is older than the top. By bending the clay structure into a “W” shape you are modeling what happens when the layers are bent by temperature and pressure changes in the Earth. The slice created by the butter knife represents the erosional forces that take place over many years.

If you look at the clay structure that remains, you can see a striped pattern. Patterns like this on a large scale (think mountains or exposed faults) can be seen from space and help geologists understand the history of how these landscapes formed. In the case of our modeling clay, our rocks were deposited, folded, and then eroded.

Seeing Stripes

Can you see the layers in this image of the Anti-Atlas Mountains in Morocco? Patterns in the rock layers like this help geologists understand how mountains formed, without ever having to hike to the mountain tops.

